openreach

SIN 349

Issue 2.7

January 2026

Suppliers' Information Note

For The Openreach Network

Openreach Metallic Path Facility

Interface Description

Each SIN is the copyright of British Telecommunications plc. Reproduction of the SIN is permitted only in its entirety, to disseminate information on the Openreach Network within your organisation. You must not edit or amend any SIN or reproduce extracts. You must not remove Openreach trademarks, notices, headings or copyright markings.

This document does not form a part of any contract with Openreach customers or suppliers.

Users of this document should not rely solely on the information in this document, but should carry out their own tests to satisfy themselves that terminal equipment will work with the Openreach network.

Openreach reserves the right to amend or replace any or all of the information in this document.

Openreach shall have no liability in contract, tort or otherwise for any loss or damage, howsoever arising from use of, or reliance upon, the information in this document by any person.

Due to technological limitations a very small percentage of customer interfaces may not comply with some of the individual characteristics which may be defined in this document.

Publication of this Suppliers' Information Note does not give or imply any licence to any intellectual property rights belonging to British Telecommunications plc or others. It is your sole responsibility to obtain any licences, permissions or consents which may be necessary if you choose to act on the information supplied in the SIN.

This SIN is available in Portable Document Format (pdf) from:
https://www.openreach.co.uk/orpg/home/helpandsupport/sins/sins.do

Enquiries relating to this document should be directed to: orsinsfa@openreach.co.uk

Openreach Confidential
Openreach logo are trademarks of British Telecommunications plc. © British Telecommunications plc 2026.
Openreach Limited, Registered office: 6 Gracechurch Street, London EC3V 0AT.Registered in England and Wales no. 10690039

CONTENTS

1 INTRODUCTION 3

2 SERVICE OUTLINE 3

3 METALLIC PATH FACILITY SPECIFICATION 4

4 MPF ELECTRICAL TERMINATION 6

4.1 NTP TERMINATION 6

4.1.1 *Connections Used in BT Master Sockets* 6

4.1.2 *Insulation Displacement Connectors* 7

4.2 MDF AND SDF TERMINATION 7

5 METALLIC PATH FACILITY OPERATION 7

5.1 MAXIMUM VOLTAGE AND CURRENT ON A METALLIC PATH FACILITY 7

5.2 INPUT SIGNALS ON A METALLIC PATH FACILITY 8

5.3 NOISE, INDUCED VOLTAGES AND LINE SURGES 8

5.4 SAFETY 9

5.5 POLARITY OF METALLIC PATH CIRCUIT 9

5.6 METALLIC PATH CIRCUITS OPERATING VOLTAGE AND POLARITY 10

6 FURTHER INFORMATION 10

7 REFERENCES 11

8 GLOSSARY 11

9 HISTORY 12

1 Introduction

This Suppliers Information Note (SIN) describes the technical characteristics of Openreach Metallic Path Facility (MPF). This SIN includes and aligns with the Openreach MPF Specification [1] produced by the NICC.

This SIN applies to the MPF provided in:

- the Openreach full-loop or sub-loop unbundling products,
- both the classic and shared MPF variants, and a full description of the Openreach LLU is available at Ref. (3)
- The Openreach SOTAP and SOTAP for Analogue products

Note: the term LLU Operator is used in this document to refer to the operator using a Metallic Path Facility provided by Openreach.

2 Service Outline

Figure 1 illustrates the 4 types of MPF.

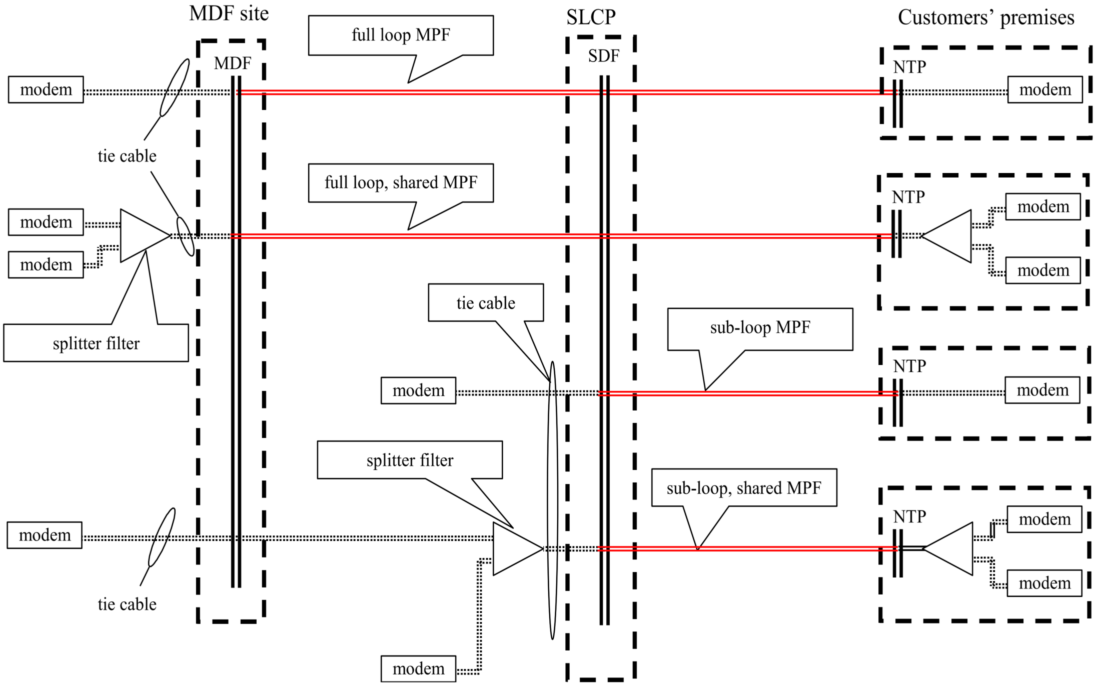
MDF site
MDF
full loop MPF
SLCP
SDF
Customers' premises
NTP
modem
tie cable
full loop, shared MPF
modem
modem
splitter filter
tie cable
sub-loop MPF
modem
splitter filter
sub-loop, shared MPF
modem
tie cable
modem

Figure 1 – MPF Types

Key

MDF	Main Distribution Frame	SLCP	Sub-loop Connection Point
NTP	Network Termination Point		(in red) metallic path facility (MPF)
SDF	Sub-loop Distribution Frame		(in black) other metallic pair cabling

As illustrated in Figure 1, both the full loop and full-loop shared MPF consist of a metallic pair from the Main Distribution Frame (MDF) to the Network

Termination Point[1] (NTP) and both the sub-loop and shared, sub-loop MPF consist of a metallic pair from the Sub-loop Distribution Frame (SDF) to the NTP.

The service(s) provided over an MPF will be the service(s) provided by the LLU Operator using the MPF and will be defined and published by that LLU Operator.

3 Metallic Path Facility Specification

The parameters of the MPF are defined for the pair from the MDF or SDF to the NTP depending on the MPF type. When testing these parameters of the MPF, the MPF must be tested in isolation from customer premises wiring and equipment and from LLU operator wiring and equipment. The parameter values listed in Table 1 apply to all types of MPF.

Attention is drawn to the recommendations of Section 6.6, adherence to these recognised telecommunication practices can benefit accuracy of results when testing the MPF electrical parameters. Prior to testing the MPF, a minimum supply voltage of $30V_{DC,}$ current limited to 60mA, should be applied across the A and B conductors for a minimum of 9 seconds. Electrical parameters may then be measured by suitable test equipment within the next 60 seconds.

Any DC voltage of 30V or above (up to the maximum defined in Section 6.1) can in fact be applied. It may be more convenient to apply standard PSTN battery voltage ($-48V_{DC}$ nominal), current limited to 60mA, in which case the voltage need only be applied for a minimum of 5 seconds.

The polarity of the voltage applied is not critical but it is recommended that standard industry practice be followed as defined in Section 6.6.

Parameter (note 5)	**Value** (taking account of notes 1 to 5)
Electrical continuity	The MPF will be a continuous metallic connection between MDF in BT premises and a network termination point at the end customer premises.
Insulation Resistance (note 1) A-B or B-A	Greater than 100 kOhm
Insulation Resistance (note 1) Wire – Earth	Greater than 100 kOhm
Insulation Resistance (note 1) Wire - Battery	Greater than 100 kOhm

---

[1] The NTP is the legal demarcation between the network provider's cabling and the customer's in-house wiring. On a telephone line this point resides on the master socket or NTE ("Network Termination Equipment").

Parameter (note 5)	**Value** (taking account of notes 1 to 5)
Voltage between the wires (note 2)	$-55 < V_{DC} < +55$ Volts DC (note 6) $V_{AC} < 15$ Volts
Voltage between either wire and earth. (note 2)	$-55 < V_{DC} < +3$ Volts (note 6) $V_{AC} < 15$ Volts
Loop Resistance (note 3)	Less than 1800 Ohm
Difference in measured earth capacitance between A leg and B leg using line test system	$C_{A\text{-}E} > 0.85 \times C_{B\text{-}E}$ AND $C_{B\text{-}E} > 0.85 \times C_{A\text{-}E}$
Maximum Insertion Loss (note 4)	50dB at 100kHz

Table 1 - **MPF Parameters**

Note 1: Measurement of Insulation Resistance

Insulation resistance is measured using a voltage of $30V_{DC}$. Resistance is measured between the wires using each polarity in order to detect rectified faults. Resistance between wire and earth or battery is measured to detect contact faults between adjacent wire pairs.

The MPF will be categorised faulty if any measured resistance is below the threshold values.

Note 2: Measurement of Voltage

The presence of voltages on the pair will be measured using a voltmeter with internal impedance of nominally 100 kOhm. The AC voltage measurement will only include frequencies up to 100 Hz (such that the second harmonic of the AC mains supply is included). Voltage spikes i.e. peaks of voltage occurring less frequently than 1 per second and with a duration of less than 1 ms will be ignored in this measurement.

Note 3: Resistance is measured using a voltage of $30V_{DC}$. The MPF will be categorised faulty if the measured resistance exceeds the threshold value.

Note 4: Insertion Loss is to be measured at 100 kHz between 140 Ohm resistive (non-reactive) terminations when using a nominal transmit power of anywhere between –10dBm and 0 dBm.

Note 5: Any measurement made with respect to earth will be made using the earth at the Openreach MDF site for full loops and the earth at the SCLP for sub-loops. Any measurement made with respect to battery will be made using the BT exchange battery.

Note 6: D.C voltages of the magnitude specified should only occur as a result of a network fault condition. The MPF user should ensure that equipment utilising the MPF is capable of withstanding D.C voltages of the magnitude specified.

4 MPF Electrical Termination

The MPF consists of two metallic conductors designated as the 'A' and 'B' wires.

4.1 NTP Termination

The connection to the MPF at the NTP end can be either a BT Master socket or in the form of an Insulation Displacement Connection (IDC) cable termination. (Note: The front plate on the NTE may not be provided, in which case only the socket (and not the IDC termination) will be available).

4.1.1 Connections Used in BT Master Sockets

When the MPF is terminated on a BT Master socket, connection to the MPF is provided by the socket or the Insulation Displacement Connector (IDC) on the Customer Connection Unit (i.e. front plate) of the network terminating equipment. The IDC will accept the connection of solid copper conductors between 0.4 mm and 0.63 mm diameter. The connections for the socket and the IDC are as shown in the Table 1.

Socket Contacts	
1	Not To Be Used
2	'A' wire or 'B' wire
3	Not To Be Used
4	Shunt connection
5	'B' wire or 'A' wire
6	Not To Be Used

IDC Contacts	
6	Not To Be Used
5	'A' wire or 'B' wire
4	Not To Be Used
3	Shunt connection
2	'B' wire or 'A' wire
1	Not To Be Used

Table 1: BT Master Socket and IDC Contacts

Note 8: The contact assignment for the socket and IDC is the same contact assignment as used for the BT single line analogue PSTN interface. A different contact assignment is used for BT 2-wire analogue private circuits

Note 9: The shunt connection is derived from the centre point between a 470 kOhm resistor and a 1.8 μF capacitor connected in series across the 'A' and 'B' wires. Additionally there is an overvoltage protection device connected across the 'A' and 'B' wires.

Note 10: Contact 6 is adjacent to the latch.

Note 11: Plugs that meet the requirements of BS 6312:Part 1:1994 [2] and wired to correspond with Figure 2 will be compatible with the BT provided socket.

Note 12: The different types of NTE currently deployed within the BT network present from 3 to 6 IDCs for the termination of extension wiring, however, the essential connections, IDC '2', '3', & '5', will always be present and the numbering kept consistent.

Note 13: The numbering of IDC and Master Socket contacts are reversed; for example the 'shunt connection' is presented on IDC '3' and at Master Socket contact '4'.

4.1.2 Insulation Displacement Connectors

When the BT network interface is terminated with insulation displacement connectors they will accept the connection of solid copper conductors between 0.4 mm and 0.63 mm diameter.

4.2 MDF and SDF Termination

Direct connection to the network end of the MPF (i.e. at the MDF) or SDF is not provided.

Indirect connection to the MPF is provided via an Internal Tie Cable at the MDF and an External Tie Cable at SDF.

The interface to the network end of the MPF will be at the Handover Distribution Frame (HDF) within the LLU Operator’s collocation space or in the housing used by the LLU Operator for distant location.

Indirect connection to the SLCP is provided via External Tie cables.

5 Metallic Path Facility Operation

In order to maintain network integrity and for health and safety reasons, equipment to be connected and use an MPF needs to fulfil certain technical requirements. These requirements are given below.

5.1 Maximum Voltage and Current on a Metallic Path Facility

The voltage and current applied by an LLU Operator to a Metallic Path Facility (MPF) in the BT network must be limited for several reasons:

- To ensure the safety of BT personnel working on the network.
- To protect the network from damage.
- To ensure that the overvoltage protection devices built into BT's metallic network are not inadvertently triggered.

Voltages and currents (including the telecommunications signal) applied to the MPF must not:

- Apply an open circuit voltage greater than 120V peak of either polarity with respect to earth to either leg of the MPF (note 14).

- Apply an open circuit voltage greater than 200V peak between the two legs of the MPF (note 14).
- Cause greater current to flow then 60mA peak in either leg of the line (note 14).

Voltage measurements will be made using a high internal impedance (10 MOhm) voltmeter.

Additionally if it is intended to apply line voltages greater than 120V peak between legs of the MPF, the equipment must conform to IEC 60950-1 [4] and IEC 60950-21 [5]. See note 15.

Note 14: The voltages and currents are absolute limits including AC signals at any frequency together with any DC power supplied to customer sited equipment. They apply at all times including when LLU Operators are carrying out tests on MPFs.

Note 15: IEC 60950-1 covers all the safety aspects of all information technology equipment. This document defines the safe voltage (120V between conductors) above which the operating characteristics of the equipment feeding power to lines must be governed for safety reasons. The required characteristics of the power feeding system are further defined in IEC 60950-21 [2].

IEC 60950-21 allows a range of operating voltages above 120V, but for a given voltage they define:

- The maximum current which can be fed to earth (e.g. in the event of human contact).
- The maximum current which can be passed from one 'leg' of the copper pair to the other 'leg' via an inadvertent contact.
- The time taken to shut down the power supply in the event of an inadvertent contact.
- The maximum effective capacitance (to earth and between line 'legs') of the terminating equipment (this defines the maximum fault current through a human contact **after** the power supply has been tripped).

5.2 Input signals on a Metallic Path Facility

Any signal applied to the MPF must conform to the Access Network Frequency Plan for the BT network [6].

5.3 Noise, Induced Voltages And Line Surges

The Openreach network interface conditions described in this SIN are those encountered when there is no interference and the earth potential at the local exchange and the NTP is the same. In practice these conditions may be modified as follows.

- Permanent longitudinal direct voltages up to 4 V may exist on the MPF.
- Permanent longitudinal alternating voltages up to 5 V r.m.s. 50 Hz, and associated harmonics, may exist on the MPF. Additionally there may be an earth potential difference up to 3 V r.m.s. 50 Hz.

- Permanent longitudinal and transverse alternating voltages, which generally do not exceed 3 V r.m.s., at other frequencies up to 2 MHz may exist on the line. These are generally noise voltages, but between 200 kHz and 2 MHz they may be amplitude modulated and be as a result of radio broadcast signals.
- Uniform spectrum and random noise having a power of -42 dBm in the frequency range 300 Hz to 3400 Hz may exist on the line, with random impulsive noise in excess of -22 dBm. Also, other types of random transmission impairment may occur, such as interruptions, phase changes, phase jitter and gain changes.

5.4 Safety

British Telecommunications plc consider that Network Terminating Points of the Public Telecommunications Network provided by ourselves satisfy the requirements of the Electricity at Work Regulations in as far as is reasonable and practicable. We believe that the Openreach Network is in accordance with relevant safety legislation.

Openreach however cannot influence the possibility of a fault occurring or Rise of Earth Potential provision on customer's premises and therefore the customer/LLU Operator is responsible for protecting themselves and the Openreach network from these possibilities in respect of both safety and protection.

Note: MPF cannot be provided at or near sites where high voltages are present (e.g. Hot sites and their zones of influence*) that could lead to a high rise of earth potential. Provision of telecommunication services to such sites requires special attention (see BS6701 [7]) and requires the use of an isolation device. Such devices prevent the provision of a continuous metallic path as required by the MPF specification [1].

*Note: A Hot Site is primarily found in the vicinity of an electricity generation or transforming station or other operational buildings, or in "hot zones" which may extend beyond the perimeter of the associated electricity station. It is the Communications
Provider's responsibility to check and confirm whether the End User Site is a designated Hot Site

Provided the customer/LLU Operator observes these requirements then the safety status of compliant apparatus will not be compromised whilst it is connected to the Network Terminating Point.

The safety classification of an interface is, as described in R0BT-002/EG 201 212 [8], determined by both the working voltage of the interface and the interface environment (exposed or unexposed). The working voltage of the interface is dependent on the voltages applied to the MPF by the LLU Operator (see also section 5.1). The environment of the MPF is exposed.

5.5 Polarity of Metallic Path Circuit

The polarity of a MPF may be changed as a result of external maintenance activity eg when an MPF has been repaired following physical damage. LLU Operators are advised to ensure that their equipment will operate correctly when a line is reversed in polarity.

5.6 Metallic Path Circuits Operating Voltage and Polarity

LLU Operators are recommended to follow recognised telecommunication practices of:
- applying a wetting current to the MPF at all times
- operating the MPF so that where possible the voltages are negative with respect to earth.

6 Further Information

For further information, visit the Openreach LLU product website at: http://www.openreach.co.uk/orpg/home/products/llu/llu.do

Alternatively please contact your Customer Business Manager (CBM).

If you have enquiries relating to this document then please contact: orsinsfa@openreach.co.uk

7 References

[1]	BT MPF Specification, Issue 4 - ND1601:2005/05
[2]	BS6312:Part 1 'Connectors for analogue telecommunications interfaces - Specification for plugs'
[3]	http://www.openreach.co.uk/orpg/home/products/llu/llu.do
[4]	IEC 60950-1 Edition 1.0 (Safety of Information Technology Equipment)
[5]	IEC 60950-21 Edition 1.0 (Safety of Information Technology Equipment - Remote Power Feeding)
[6]	'Specification of the Access Network Frequency Plan applicable to transmission systems used on the BT Access Network' – NICC Document ND1602:2005/05
[7]	BS 6701 Code of Practice for installation of Apparatus that is intended for connection to certain telecommunication systems
[8]	R0BT-002/EG 201 212 V1.2.1: Electrical safety; Classification of interfaces for equipment to be connected to telecommunication networks

For further information or copies of referenced sources, please see document sources

at: https://www.openreach.co.uk/orpg/home/helpandsupport/sins/sins.do

8 Glossary

CPE	Customer Premises Equipment
HDF	Handover Distribution Frame
IPR	Intellectual Property Rights
LLU	Local Loop Unbundling
LLU Operator	A network operator using a MPF
MDF	Main Distribution Frame
MPF	Metallic Path Facility
NTP	Network Terminating Point
SDF	Sub-loop Distribution Frame
SIN	Suppliers' Information Note
SLCP	Sub-loop Connection Point

9 History

Issue 1	July 2000	First Issued
Issue 1.1	September 2001	Editorial changes
Issue 1.2	January 2003	Editorial changes to take account of publication of Issue 2 of BT ANFP, Issue 2 of BT MPF Specification, and publication of IEC 60950-1. Inclusion of new Note 12.
Issue 1.3	June 2003	Editorial changes. Approval Requirements statement removed, information available via SINet Useful Contacts page. Update references to take account of publication of Issue 3 of BT MPF Specification.
Issue 1.4	July 2003	Section 5.1 edited to reflect LLU Briefing Note submitted to industry 04/07/2003.
Issue 1.5	July 2004	Editorial changes
Issue 2.0	July 2005	Updated to take account of publication of Issue 4 of NICC BT MPF Specification and to extend the scope to include full and sub-loop, classic and shared of the BT LLU products.
Issue 2.1	June 2008	Updated contact information and website link under "Further Information". Also editorial amendment.
Issue 2.2	July 2008	Added the previous issue's website link to the list of references.
Issue 2.3	July 2009	Clarified the term "hot-sites and their zone of influence" at Section 5.4 (Safety).
Issue 2.4	November 2011	Updates to Product websites made.
Issue 2.5	August 2015	Withdrawal of 6db Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/
Issue 2.6	August 2020	Changes to branding, from BT to Openreach including changes to reflect new Openreach SIN site and Openreach SIN email address
Issue 2.6	July 2021	Annual Review – no changes required – issue remains unchanged.
Issue 2.6	July 2022	Annual Review – no changes required – issue remains unchanged.
Issue 2.6	September 2023	Annual Review – no changes required – issue remains unchanged.
Issue 2.6	October 2024	Annual Review – no changes required – issue remains unchanged.
Issue 2.6	November 2024	SOTAP details updated
Issue 2.7	January 2026	Corrected error in MPF facility specification table. Removed reference to note 7, replaced with correct reference note 6. Error introduced in issue 2.5 withdrawal of 6db.

-END-